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Temporal myopia in sustainable behavior under uncertainty

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ABSTRACT

Consumers in today's world are confronted with the alarming consequences of unsustainable behavior such as pollution and resource degradation. In addition, they are facing increases in uncertainty due to external events such as economic crises and terror attacks. These two problems are central to consumers' lives, occur on a global scale, and have significant impact on the world's political, economic, environmental, and social landscapes. Contributing to research on persuasion and pro-social behavior, we show in four studies, conducted online, in the lab, and in the field, that these two problems are interconnected. Studies 1 and 2 demonstrate that uncertainty leads to lower levels of sustainable behavior in comparison to certainty. Study 2 reveals in addition that this is due to the display of higher levels of temporal discounting under uncertainty (i.e., adopting a more immediate orientation). Finally, Studies 3 and 4 show that emphasizing the immediate benefits of sustainability during uncertainty reverses the negative effect and leads consumers to act more sustainably. Overall, these findings provide valuable implications for policy makers and responsible marketers.

1. Introduction

People today are confronted with several significant societal problems. One prominent problem is the lack of sustainable behavior. Concerns regarding the environment are increasing rapidly with the growing world population, consumption and globalization that threaten nature and resources by degradation, pollution, and climate change (Botkin & Keller, 2010; Gardner & Stern, 2002; Penn, 2003). Encouraging consumers to act sustainably is a difficult task, as environmental issues are often perceived as complex, abstract and insignificant in terms of their direct impact on consumers (Dietz, Ostrom, & Stern, 2003; Spence & Pidgeon, 2010). A second prominent problem consumers are facing today is the increase in uncertainty in their everyday lives. Due to external, societal events like terror attacks, volatile economies, and intensive migration, consumers are confronted with higher levels of unpredictability and change (Arkin, Oleson, & Carroll, 2013). For instance, people do not know where and when terror attacks will take place (Daase & Kessler, 2007), whether their jobs will be secure during economic recessions (Karanikolos et al., 2013), and how immigration will impact society (Esses, Medianu, & Lawson, 2013).

Backed up by anecdotal evidence which shows that an increase in unemployment rates decreases public concern for the environment (Scruggs & Benegal, 2012) and that economic crises result in a deadlock of climate policy (Geels, 2013; Skovgaard, 2014;

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The World Bank, 2016), there is reason to suspect that these two world problems are interconnected. Specifically, it can be inferred that increased levels of uncertainty negatively impacts sustainable behavior. Contributing to research on persuasion and pro-social behavior, the current research offers a novel attempt to jointly study uncertainty and sustainable behavior. Through four studies conducted online, in the lab, and in the field, this research demonstrates how uncertainty negatively affects consumers' sustainable behavior and how this negative impact can be reversed. In doing so, this research goes beyond anecdotal evidence and offers causal support for the link between uncertainty and sustainability. Furthermore, this research sheds light on the underlying mechanism, demonstrating that the negative influence uncertainty has on sustainable behavior is driven by temporal discounting – the preference for smaller immediate rewards over bigger future ones (Green & Myerson, 2004; Halevy, 2008). Finally, and importantly, this research shows that emphasizing the immediate benefits of sustainable behavior can be used to effectively lead consumers to act more sustainably under uncertainty. Contrary to earlier research suggesting that the immediate benefits of sustainable behavior need to be emphasized independent of the context (e.g., Gardner & Stern, 2002; Leiserowitz, 2005; Li, Johnson, & Zaval, 2011), the current research demonstrates that uncertainty is an important moderator (i.e., emphasizing the immediate benefits of sustainable behavior is a fruitful strategy only under uncertainty, not certainty).

2. Conceptual development

2.1. Uncertainty

In light of the omnipresent and multifaceted role uncertainty plays in human life, as well as in research across multiple domains (e.g., marketing, economics, decision-making), it is not surprising that it has been conceptualized in a variety of different ways (e.g., Fox & Ulkümen, 2011; Kahneman & Tversky, 1982; Lipshitz & Strauss, 1997). Among the various forms of uncertainty, Fox and Ulkumen recently distinguished between two key dimensions: aleatory and epistemic uncertainty. Aleatory uncertainty refers to probabilistic variability, which cannot be reduced, and is viewed as random and unpredictable (e.g., whether or not the home team will win a soccer game). Epistemic uncertainty, on the other hand, refers to uncertainty that arises due to a lack of confidence in one's knowledge (e.g., whether or not one has correctly answered a question from the game "Trivial pursuit"). Importantly, Fox and Ulkumen claim that aleatory uncertainty and epistemic uncertainty are not mutually exclusive. When events involve both forms of uncertainty, such as in unknown probabilities scenarios (e.g., *whether* a soccer team will win and the *chances* that a soccer team will win are both unknown), people feel particularly uncertain (Ellsberg, 1961). This is due to a lack of confidence in one's assessment of the probability distribution.

Uncertainty due to external, unpredictable events (e.g., terror attacks, volatile economies, intensive migration) is typically characterized by a combination of aleatory and epistemic uncertainty. Because of the complexity of the events and the absence of reliable estimates regarding their occurrence and outcomes, consumers are not able to make an assessment of the probability that, for instance, a terror attack will hit their city, or whether their job will be lost due to economic crisis or immigration. As such, uncertainty increases depending on the features of the events: volatile and complex events are less predictable in terms of their occurrence and their consequences, and are therefore more likely to induce uncertainty than simpler, more stable events (Milliken, 1987; Van Horen & Mussweiler, 2014). Importantly, such external events can create psychological states of uncertainty only to the extent that the event is relevant to the person's self (Faraji-Rad & Pham, 2016; Van den Bos, 2001). Therefore, in the current research we define uncertainty as the inability to estimate the impact of external, societal events on one's life, and the inability to predict their associated outcomes.

2.2. Uncertainty and sustainability

Even though the prevalence of uncertainty in consumers' lives has increased and has become one of the defining challenges of modern times (Arkin et al., 2013), little is known about how feelings of uncertainty affect consumer behavior in a variety of important societal domains, such as sustainability. Here we argue that uncertainty may have an unwelcome effect on the serious global problem of unsustainable behavior. Some indirect or anecdotal evidence already points in that direction. For instance, crises around the economy and immigration have resulted in a rightward shift in the political climate, which often leads sustainability issues to be ignored or disregarded (Mayer, 2013; Neumayer, 2004; Yilmaz, 2012). Moreover, the economic crisis of 2008 has played a major role in holding back climate policy, shifting investment priorities from climate endeavors (for example investment in renewable energy) to the protection of financial systems (Geels, 2013; Skovgaard, 2014; The World Bank, 2016). Additionally, due to an increase in unemployment rates, as a result of the economic recession, the public concern for the environment decreased (Scruggs & Benegal, 2012).

But why would uncertainty lead to unsustainable behavior? One possible reason is that sustainable behavior carries a strong future component, as it requires optimizing environmental, social, and economic consequences to meet future generations' needs (e.g., Luchs, Walker Naylor, Irwin, & Raghunathan, 2010; Phipps et al., 2013). As such, research has shown that sustainable behavior increases when a future orientation is activated (Van Trijp, 2014). For example, consideration of future consequences positively predicted the likelihood of commuting by public transportation (Joireman, Van Lange, & Van Vugt, 2004). Indeed, a recent meta-analysis has demonstrated that future orientation is a stronger predictor of sustainable behavior for consumers than pro-environmental attitudes (Milfont, Wilson, & Diniz, 2012).

On the other hand, indirect evidence indicates that increased levels of uncertainty lead consumers to focus on immediate, instead of future, outcomes. For instance, during the 2008 economic recession, the purchase of lower priced products, as compared

to longer-lasting higher quality products, increased (Kamakura & Du, 2012; Lamey, Deleersnyder, Dekimpe, & Steenkamp, 2007). In addition, threats of terror led to increased materialism and greediness. For example, after 9/11, people spent more money on pleasurable items such as clothing and entertainment, and wanted to profit more than others from collective resources in a forest management game, leading them to overconsume these resources (Kasser & Sheldon, 2000).

One theoretical paradigm that may explain why consumers become more focused on immediate benefits under uncertainty, and could thereby help to clarify why uncertainty leads to a decrease in sustainable behavior, is life history theory. Life history theory states that consumers adopt a life strategy that varies on a continuum from being focused on future outcomes (slow life strategy) to being focused on immediate outcomes (fast life strategy; Kaplan & Gangestad, 2005). The decision to prefer one strategy to the other depends mainly on the harshness and predictability of the environment in which consumers live and the certainty they have regarding their future (Nettle, 2010). According to the theory, it is beneficial to follow slower life strategies when the environment is certain in order to ensure future outcomes, as it enhances future survival. On the contrary, in an uncertain environment it is more beneficial to adopt faster life strategies to ensure some immediate outcomes (i.e., immediate survival), as it is unknown what the future holds (Chisholm et al., 1993; Ellis, Figueredo, Brumbach, & Schlomer, 2009; Griskevicius et al., 2013). In other words, people's instinctive behavioral response is to display higher levels of temporal discounting – i.e., opting for smaller immediate rewards over bigger future ones (Green & Myerson, 2004; Halevy, 2008) – while coping with uncertainty.

Building on fast life history, we propose that consumers are more likely to display higher levels of temporal discounting to ensure immediate benefits when they experience uncertainty. Such a tendency is contradictory to sustainable behavior, which is inherently associated with a future orientation (Luchs et al., 2010; Phipps et al., 2013). Hence, there seems to be a mismatch between uncertainty and sustainable behavior, leading to the prediction that uncertainty would negatively affect sustainable behavior. Specifically, in order to establish whether this negative effect is due to the conflicting temporal focus (i.e., sustainable behavior needs a future oriented focus, while people tend to focus on immediate benefits when facing uncertainty) we test the mediating role of temporal discounting. Hence, we expect that uncertainty increases temporal discounting, which in turn negatively affects sustainable behavior. Overall, we formally propose that:

H1. Consumers display lower levels of sustainable behavior during uncertainty as opposed to certainty.

H2. Temporal discounting mediates the negative effect of uncertainty on sustainable behavior.

2.3. Reversing the negative impact of uncertainty on sustainability

In a world in which uncertainty is highly prevalent (Arkin et al., 2013) and the promotion of sustainable behavior is crucial, it is necessary to find ways to overcome the mismatch between uncertainty (which fosters higher levels of temporal discounting) and sustainability (which requires lower levels of temporal discounting). Here, we propose that emphasizing the immediate benefits of sustainable behavior (e.g., sustainable seafood supports the *current* survival of marine life), as compared to the future benefits (e.g., sustainable seafood supports the *future* survival of marine life) could be a simple, but highly effective strategy to increase consumers' sustainable behavior under uncertainty, as it fits with people's heightened temporal discounting levels when facing uncertainty.

Under certainty, however, predictions are less straightforward as previous research demonstrates mixed views. One line of work suggests that immediate benefits, and not future benefits, should be emphasized in order to enhance sustainable behavior (e.g., Gardner & Stern, 2002; Leiserowitz, 2005; Li et al., 2011). For instance, Li and colleagues showed that when people were made aware that the *current* day temperature was warmer than usual, it increased people's sustainable attitudes and behavior. In addition, Gardner and Stern showed that sustainable marketing strategies that highlight the consequences of wasteful behavior on future generations have found to be ineffective. However, a different line of work based on life history theory suggests that in certain environments survival chances can be increased by focusing on future benefits as it is then beneficial to adopt slower life strategies (Chisholm et al., 1993; Ellis et al., 2009; Griskevicius et al., 2013). Hence, for certainty, the effect of emphasizing immediate or future benefits on sustainable behavior is unclear. Overall we therefore develop a formal hypothesis only for the uncertainty condition:

H3. Emphasizing immediate benefits of sustainability as opposed to future benefits increases sustainable behavior under uncertainty.

2.4. Current research

To test the hypotheses and generalizability of our findings, four experimental studies were conducted, online, in the lab, and in the field. Study 1 (lab experiment) tested whether uncertainty leads to lower levels of intentions to behave sustainably (measured by willingness to pay for sustainable products) as compared to certainty (H1). Study 2 (online experiment) showed the robustness of the effect by replicating the main negative effect of uncertainty on sustainable attitude and product choice, also testing the underlying mechanism of temporal discounting (H2). Study 3 (lab experiment) and Study 4 (field study) investigated whether emphasizing immediate benefits of sustainability could be used as a strategy to reverse the negative effect of uncertainty on sustainable behavior, by measuring attitudes and actual donation behavior (H3). As a critical test of the strategy, the field study was conducted at the central train station in Brussels two weeks after the terror attacks on Brussels' international airport and subway system on March 22, 2016, utilizing the high levels of uncertainty in the days following the tragic event.

The predictions were tested across a variety of sustainability measures (actual donation behavior, sustainable attitudes, and willingness to pay for sustainable products), empirical settings (lab, online, and field), and manipulations of uncertainty (e.g., feelings of uncertainty elicited through personally recalled events, economic crises, and terror attacks) to demonstrate the generalizability and robustness of the results.

3. Study 1: uncertainty and sustainability

Study 1 tests H1, that uncertainty leads to lower levels of sustainable consumer behavior, in a controlled experimental setting. In order to rule out any general negative effect of uncertainty on consumer behavior, such as decreased consumption of all types of products, we measure willingness to pay for both sustainable products *and* conventional products.

3.1. Method

3.1.1. Participants and design

Eighty students from a Dutch university ($M_{age} = 21.59$, $SD = 3.02$; 61.3% female) took part in the 2 (condition: uncertain vs. certain) × 2 (type of product: sustainable vs. conventional) between-subjects experiment for a small monetary reward.

3.1.2. Stimuli

3.1.2.1. Uncertainty manipulation. Uncertainty was manipulated by a reading and writing task. Specifically, participants read the following paragraph: "Uncertainty (Certainty) is highly prevalent in our lives, since nothing (almost everything) in the world is stable. The future is affected by coincidental (expectable) world events that cannot (can) be foreseen and the behavioral outcomes of our actions are unknown (more or less known) to us. We cannot (can) make predictions about how world events will affect our lives, because everything (nothing) in life really changes." Afterwards, participants were asked to write about a situation that happened in their lives that was either uncertain or certain.

A pretest was conducted to test whether the uncertainty paragraph indeed activated more uncertainty than the certainty paragraph. Additionally, as the paragraphs used words such as "future" and "foreseen," the pretest examined whether the conditions differed in temporal orientation. This would rule out the alternative explanation that sustainable behavior is decreased under uncertainty, because of the higher future orientation in the uncertainty condition. Thirty M-Turk participants ($M_{age} = 33.40$, $SD = 9.19$; 43.3% female) read the paragraphs (in random order) and indicated whether the text focused more on uncertainty or certainty on a 7-point Likert scale ranging from 1 (*uncertainty*) to 7 (*certainty*), and whether the text was more present- or future-oriented on a 7-point Likert scale ranging from 1 (*present*) to 7 (*future*). The results revealed that the manipulation of uncertainty was successful, $F(1, 29) = 60.51$, $p < .001$, part. $\eta^2 = 0.68$. Participants indicated that the world was described as more uncertain in the uncertainty condition ($M = 2.20$, $SD = 2.02$) than in the certainty condition ($M = 6.10$, $SD = 1.58$). Furthermore, and as intended, the uncertainty ($M = 6.10$, $SD = 1.32$) and certainty conditions ($M = 6.10$, $SD = 1.24$) did not differ in their temporal orientation, $F(1, 29) < 0.01$, $p = 1.00$.

3.1.2.2. Products. Three products were selected for the study, which are commonly used by students: jeans, candles, and copy paper. They represented a mix of both utilitarian and hedonic products and differed in pricing. The same product was either accompanied with a sustainability logo (i.e., sustainable product) or without a sustainability logo (i.e., conventional product; see Appendix A). A pretest was conducted to test if the products provide clear immediate or future benefits, as, in case that the product descriptions yield clear future benefits, this could explain a decrease in liking in the uncertainty condition. The same thirty M-Turk participants reported above were presented with the three products (in random order) and were asked to indicate whether each product provides more immediate or future benefits on a 7-point Likert scale ranging from 1 (*immediate benefits*) to 7 (*future benefits*). Results indeed showed that the benefits of all three products were perceived as neither immediate nor future-oriented, as none of the scores deviated from the midpoint of the scale [4]; jeans ($M = 4.23$, $SD = 1.81$), $t(29) = 0.71$, $p = .49$, candles ($M = 3.77$, $SD = 1.83$), $t(29) = -0.70$, $p = .49$, and copy paper ($M = 4.30$, $SD = 1.80$), $t(29) = 0.91$, $p = .37$.

3.1.3. Procedure and measures

After giving their informed consent, participants were randomly assigned to either the uncertainty or certainty condition, in which they had to read a paragraph about (un)certainty and subsequently had to describe in detail a (un)certain situation that had happened in their lives. To measure sustainable behavioral intentions, participants were then asked to indicate their willingness to pay for all three products (jeans, candles, copy paper) on a slider scale. For the jeans, the scale ranged from 45 to 80 euros in seven increments of 5 euros (the average price Dutch consumers pay for jeans is 75 euros; Van Rossum, 2012). For the candles, the scale ranged from 2.15 to 4.95 euros in seven increments of 40 cents (the typical market price for such candles is 4.95 euros[1]). For the copy paper, the scale ranged from 3.35 to 7.55 euros in seven increments of 60 cents (the typical market price for this copy paper is 7.25 euros[2]). Because students have generally low budgets and are less willing to pay a high price for these products, the typical market prices were at the high end of the price range to increase variation. Still the majority of participants were only will-

[1] https://www.ecozo.nl/nl/fairtrade-stompkaars-7-5-cm.
[2] https://www.amazon.com/Hammermill-Digital-Letter-Bright-102467R/dp/B00006IDP3.

ing to pay the lowest price for all three products. In the sustainable product condition, participants indicated their willingness to pay for the three products *with* a sustainability logo, whereas in the conventional product condition, participants indicated their willingness to pay for the same three products *without* a sustainability logo. This was followed by a manipulation check where participants were asked to indicate the extent in which the world was described as certain/predictable on a 7-point Likert scale from 1 (*very uncertain/unpredictable*) to 7 (*very certain/predictable*). To control for mood, participants were asked to indicate how the situation they described made them feel ranging from 1 (*very bad*) to 7 (*very good*). Finally, participants were asked to answer some demographic questions and were thanked for their participation.

3.2. Results

3.2.1. Manipulation check

The results from the MANOVA revealed that the manipulation of uncertainty was successful. In the uncertainty condition, participants indicated that the situation they described was more uncertain ($M = 1.78$, $SD = 1.05$), $F(1, 78) = 265.95$, $p < .001$, part. $\eta^2 = 0.77$ and more unpredictable ($M = 1.90$, $SD = 1.48$), $F(1, 78) = 83.48$, $p < .001$, part. $\eta^2 = 0.52$, in comparison to participants in the certainty condition (respectively, $M = 6.03$, $SD = 1.27$ and $M = 5.45$, $SD = 1.96$).

3.2.2. Willingness to pay

As the products differed in price range, the willingness to pay items for the three different products was combined by means of averaging their z-scores. The results from the ANOVA revealed that there was no main effect of condition ($F(1, 76) = 1.86$, $p = .18$, part. $\eta^2 = 0.02$) or type of product ($F(1, 76) = 2.35$, $p = .13$, part. $\eta^2 = 0.03$) on willingness to pay. As predicted, the analysis revealed an interaction between condition and type of product, $F(1, 76) = 5.33$, $p = .02$, part. $\eta^2 = 0.07$ (displayed in Fig. 1). Simple effect tests revealed that participants in the uncertainty condition ($M = -0.23$, $SD = 0.61$) were less willing to pay for sustainable products than participants in the certainty condition ($M = 0.29$, $SD = 0.80$), $F(1, 76) = 6.74$, $p = .01$, part. $\eta^2 = 0.08$. No difference between conditions was found for the willingness to pay for the conventional products ($M_{Uncertain} = -0.12$, $SD = 0.51$; $M_{Certain} = -0.25$, $SD = 0.54$), $F(1, 76) = 0.45$, $p = .51$, part. $\eta^2 = 0.01$. Moreover, participants in the uncertainty condition were willing to pay the same price for the sustainable products and the conventional products, $F(1, 76) = 0.30$, $p = .59$, part. $\eta^2 = 0.004$, whereas participants in the certainty condition were willing to pay more for the sustainable products ($M = 0.29$, $SD = 0.80$) than for the conventional products ($M = -0.25$, $SD = 0.54$), $F(1, 76) = 7.38$, $p = .01$, part. $\eta^2 = 0.09$.

3.2.3. Mood

The results from the ANOVA revealed that condition affected mood, $F(1, 78) = 35.41$, $p < .001$, part. $\eta^2 = 0.31$. Participants in the certainty condition displayed a more positive mood ($M = 4.83$, $SD = 1.34$) as opposed to participants in the uncertainty condition ($M = 3.25$, $SD = 1.01$). When mood was included as a covariate, results revealed no main effect of mood on willingness to pay, $F(1, 75) = 1.63$, $p = .21$, part. $\eta^2 = 0.02$, and, importantly, the predicted interaction between condition and the products' sustainability remained significant, $F(1, 75) = 5.31$, $p = .02$, part. $\eta^2 = 0.07$.

3.3. Discussion

Study 1 shows that when consumers feel uncertain they are less willing to pay for sustainable products as compared to when they feel certain. Moreover, uncertain consumers are not willing to pay more for sustainable products as compared to conventional products, even though sustainable products are more expensive than conventional ones (Deleersnyder, Dekimpe, Sarvary, & Parker, 2004). Hence, these results provide evidence that uncertainty indeed decreases consumers' intention to behave sustainably (H1).

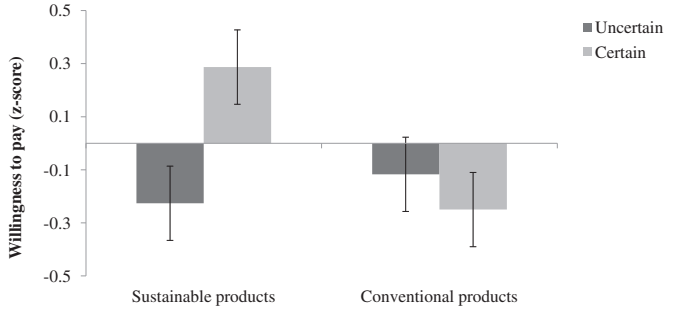

Fig. 1. Influence of condition (uncertain vs. certain) and product type (sustainable vs. conventional) on willingness to pay (Study 1). Error bars indicate ± 1 standard error of the mean.

4. Study 2: mediating role of temporal discounting

Study 1 showed that consumers are less willing to pay for sustainable products when feeling uncertain in comparison to feeling certain. Study 2 contributes to the first study in two ways: first, it investigates the mediating role of temporal discounting. More specifically, we predict that when primed with uncertainty, as compared to certainty, participants display higher levels of temporal discounting (i.e., opting for immediate benefits), which in turn leads to a decrease in sustainable product preferences (H2). Second, the study aims to replicate the former results by using a different uncertainty manipulation (economic crisis), different products (luxurious vs. sustainable), and different measurements of sustainable behavioral intentions (sustainable attitude and sustainable product choice) in order to demonstrate the robustness of the findings. Particularly, the luxurious products were used to test whether the results still hold after increasing the attractiveness of the conventional product – offering a conservative test of our theory.

4.1. Method

4.1.1. Participants and design

A sample of 213 Dutch participants ($M_{age} = 25.71$, $SD = 10.00$; 58.7% female) was recruited via email using snowball sampling and participated voluntarily in a two group (condition: uncertain vs. certain) between-subjects design.

4.1.2. Stimuli

4.1.2.1. Uncertainty manipulation. In the uncertainty condition, participants read the introduction "Signs that the economy is getting worse," and then viewed six images depicting consequences of an economic crisis, such as signs of foreclosure and raising unemployment rates. In the certainty condition, participants read the introduction "A day at home: Organizing your desk" and then viewed six images depicting objects found in an office (adapted from Hill, Rodeheffer, Griskevicius, Durante, & White, 2012).

4.1.2.2. Products: luxurious vs. sustainable. Three products were selected: a dishwasher, a backpack, and a lamp (adapted from Griskevicius, Tybur, & Van den Bergh, 2010). For each of the three products, a luxurious and sustainable version was created by providing three key features of the product that were either luxurious or sustainable. All other features (e.g., price and brand) were equal across the products (see Appendix B for more detailed descriptions).

Again, to rule out whether the description of the luxurious and sustainable products differed in emphasis on immediate versus future benefits, a pretest was conducted. Twenty-eight M-Turk participants ($M_{age} = 31.18$, $SD = 7.03$; 28.6% female) viewed each of the six product descriptions in random order (sustainable dishwasher, luxurious dishwasher, sustainable backpack, luxurious backpack, sustainable lamp, luxurious lamp) and were asked to indicate whether the description of each product emphasized immediate or future benefits of the product on a 7-point Likert scale ranging from 1 (*immediate benefits*) to 7 (*future benefits*). The results of the pretest indeed showed that none of the descriptions of the three product pairs differed in emphasizing the immediate versus future benefits (dishwasher, $F(1, 27) = 2.82$, $p = .11$, backpack, $F(1, 27) = 0.13$, $p = .73$, and lamp, $F(1, 27) = 1.25$, $p = .27$).

4.1.3. Procedure and measures

After giving their informed consent, participants were randomly assigned to either the uncertainty or the certainty condition in which they were either asked to view pictures of the economic crisis or of office supplies. Then, sustainable attitudes were measured by asking participants to indicate how attractive they thought the luxurious versus sustainable option was for each of the three product pairs on a Likert scale ranging from 1 (*definitely product A* [e.g., luxurious dishwasher]) to 9 (*definitely product B* [e.g., sustainable dishwasher]). The attractiveness ratings of the three products were averaged (backpack reversed coded), with higher scores indicating a higher attractiveness of the sustainable option and lower scores indicating a higher attractiveness of the luxurious option. Participants were then asked to indicate for each of the three products (dishwasher, backpack, or lamp), whether they would buy the luxurious or sustainable option. After they had completed the attitude and choice measure, participants completed an intertemporal choice task to measure temporal discounting (see Wilson & Daly, 2004). They were asked to make seven binary intertemporal choices between two monetary options. For example, they were asked to make a choice between getting 100 euros now (immediate reward) or a larger sum after 90 days (future reward). The larger future reward started with 110 euros in the first intertemporal choice participants had to make and increased with 10 euros increments each time, ending with 170 euros in the seventh intertemporal choice. The number of times that participants chose the immediate reward was scored, where higher scores indicate higher temporal discounting (i.e., more present oriented) and lower scores indicate lower temporal discounting (i.e., more future oriented). Following the temporal discounting task, participants were asked, as a manipulation check, to indicate whether the scenarios depicted on the pictures were 1 (*uncertain*) to 5 (*certain*). This was followed by the same mood question used in Study 1. Finally, participants answered some demographic questions and were thanked for their participation.

4.2. Results

4.2.1. Manipulation check

The results from the ANOVA revealed that the manipulation was successful. In the uncertainty condition, participants indicated that the pictures depicted a less certain scenario ($M = 2.00$, $SD = 1.29$) in comparison to participants in the certainty condition ($M = 3.02$, $SD = 1.53$), $F(1, 211) = 27.60$, $p < .001$, part. $\eta^2 = 0.12$.

4.2.2. Sustainable attitude

The results from the ANOVA revealed, as predicted, that participants in the uncertainty condition displayed a more negative attitude towards the sustainable products ($M = 4.70$, $SD = 2.05$) than participants in the certainty condition ($M = 5.42$, $SD = 2.12$), $F(1, 211) = 6.41$, $p = .01$, part. $\eta^2 = 0.03$.

4.2.3. Sustainable product choice

Because participants had to choose between the luxurious and the sustainable option for each of the three products (dishwasher, backpack, and lamp), the data was restructured and a logistic random intercept regression, with condition and product as fixed effects and participant as random effect (to correct for the dependence of choice within each participant) was conducted. Results showed a marginal significant effect of condition on sustainable product choice, $z = -1.83$, $p = .07$. Participants in the uncertainty condition preferred to buy the sustainable product less (48.1%) than participants in the certainty condition (56.0%). This seems to indicate that uncertainty reduces intentions to behave sustainably.

4.2.4. Mediating effect of temporal discounting

To examine whether temporal discounting mediates the effect of uncertainty on sustainable attitude and product choice, the PROCESS macro bootstrapping procedure (10,000 bootstraps, Model 4; Preacher, Rucker, & Hayes, 2007, with certainty coded as 0 and uncertainty as 1) was employed. Results revealed that level of uncertainty positively affected temporal discounting, $b = 0.68$, $t = 2.45$, $p = .02$. After the inclusion of temporal discounting into the full model, results showed that temporal discounting negatively affected participants' sustainable attitude, $b = -0.15$, $t = -2.16$, $p = .03$, as well as sustainable product choice, $b = -0.06$, $t = -1.90$, $p = .06$, whereas the effect of uncertainty on sustainable product choice reduced to insignificance, $b = -0.19$, $t = -1.44$, $p = .15$, the effect remained significant for sustainable attitude, $b = -0.62$, $t = -2.16$, $p = .03$. The 95% bootstrapped confidence intervals for the indirect effect of uncertainty on sustainable attitude ($b = -0.10$, 95% CI $= -0.26$ to -0.02) as well as sustainable product choice ($b = -0.04$, 95% CI $= -0.11$ to -0.01) did not include zero, indicating that temporal discounting mediates the effect. Importantly, level of uncertainty and temporal discounting did not show a high correlation ($r = 0.17$), indicating that the two constructs are distinctive.

4.2.5. Mood

The results from the ANOVA revealed that condition affected mood, $F(1, 211) = 99.78$, $p < .001$, part. $\eta^2 = 0.32$. Similar to Study 1, participants in the certainty condition displayed a more positive mood ($M = 3.78$, $SD = 0.91$) as opposed to participants in the uncertainty condition ($M = 2.43$, $SD = 1.06$). When mood was included as a covariate, results revealed no main effect of mood on sustainable attitudes, $F(1, 210) = 0.74$, $p = .39$, part. $\eta^2 = 0.004$, or on sustainable product choice, $z = -0.71$, $p = .48$. More importantly, the predicted main effect of condition on sustainable attitudes remained significant, $F(1, 210) = 6.61$, $p = .01$, part. $\eta^2 = 0.03$, and the effect on sustainable product choice remained marginally significant, $z = -1.90$, $p = .06$. In addition, the mediating effect of temporal discounting remained after including mood as a covariate for sustainable attitudes ($b = -0.13$, 95% CI $= -0.33$ to -0.02) and for sustainable product choice ($b = -0.05$, 95% CI $= -0.14$ to -0.01).

4.3. Discussion

Consistent with the results of Study 1, Study 2 shows that sustainable attitude and sustainable product choice decrease when consumers face uncertainty. Moreover, the findings show that this negative effect of uncertainty on sustainable behavioral intentions is due to consumers' orientation towards immediate benefits (i.e., display higher temporal discounting levels) during uncertainty. This latter finding supports H2, demonstrating that temporal discounting mediates the negative effect of uncertainty on sustainable behavior.

5. Study 3: increasing sustainable behavior under uncertainty

Study 2 showed that consumers display higher levels of temporal discounting (i.e., become more present oriented) when experiencing uncertainty, which leads them to like sustainable products less. If consumers are more focused on the "here and now" under uncertainty, we hypothesize that highlighting the *immediate* benefits of a sustainable product could be a useful strategy to enhance sustainable behavior during uncertainty. Study 3 tests this hypothesis, and in doing so hopes to offer valuable insights for policy makers and responsible marketers. This is important, especially because sustainability campaigns often use the opposite strategy: emphasizing *future* problems or benefits, for instance by using slogans such as "no fish, no future" or "to care for the planet is to care for the future" (e.g., Greenpeace, 2017). However, such appeals that emphasize the future consequences

of non-sustainable behavior are often ineffective (Gardner & Stern, 2002). Therefore, Study 3 tests whether emphasizing the immediate benefits of sustainable behavior lead consumers to act more sustainably (H3).

5.1. Method

5.1.1. Participants and design

One hundred and sixty five students from a Dutch university ($M_{age} = 22.06$, $SD = 1.93$; 44.8% female) took part in a 2 (condition: uncertain vs. certain) × 2 (message frame: immediate vs. future) between-subjects design for class credit.

5.1.2. Stimuli

5.1.2.1. Uncertainty manipulation. The uncertainty manipulation was the same as Study 2.

5.1.2.2. Manipulation of message frame. In order to manipulate the temporal benefits of sustainable products, advertisements were created for two products (sustainable seafood and a LED bulb) which highlighted either the immediate or the future benefits of the sustainable product. The advertisement emphasizing the immediate (future) benefits of sustainable seafood read: "Choosing sustainable seafood currently reduces overfishing (imminent overfishing) and leads to immediate (future) pleasure since sustainable seafood is fresher and has a better taste (supports the survival of marine life)." The advertisement emphasizing the immediate (future) benefits of a LED bulb read: "Choosing a LED light bulb helps you save money immediately (lowers the end of the year energy bill) and it uses up to 70% less energy (reduces our future energy problems)." See Appendix C for both advertisements.

A pretest was conducted to examine whether our manipulation was successful. Within this pretest, sixty-three students ($M_{age} = 20.54$, $SD = 1.58$; 49.2% female) were randomly assigned to view the sustainable products that either highlighted the immediate benefits or the future benefits. For each product (sustainable seafood and LED bulb), participants were asked to indicate whether the product provided more immediate or future benefits on a 7-point Likert scale ranging from 1 (*immediate benefits*) to 7 (*future benefits*). Moreover, to ensure that the advertisement did not differ on other relevant aspects, participants were also asked to indicate the valence (1 = *negative*, 7 = *positive*), complexity (1 = *not complex*, 7 = *very complex*), and certainty (1 = *uncertain*, 7 = *certain*) of the products on 7-point Likert scales. Results showed that the advertisements emphasizing the immediate benefits of sustainable products were, as intended, perceived as focusing more on the immediate benefits ($M_{Seafood} = 5.06$, $SD = 1.67$ and $M_{Lamp} = 3.31$, $SD = 1.96$) than the advertisements emphasizing the future benefits of sustainable products ($M_{Seafood} = 5.94$, $SD = 0.88$ and $M_{Lamp} = 5.77$, $SD = 1.28$), $F(1, 61) = 6.79$, $p = .01$, part. $\eta^2 = 0.10$, $F(1, 61) = 34.59$, $p < .001$, part. $\eta^2 = 0.36$, respectively. Furthermore, the advertisements of both products did not differ in valence, complexity, and certainty (all $ps > 0.24$). Especially the finding that both the immediate and future benefits message frames did not differ in certainty is important, as some scholars argue that immediate benefits are inherently more certain and future benefits more uncertain (Halevy, 2008), which could alternatively explain the effect.

5.1.3. Procedure and measures

After giving their informed consent, participants were randomly assigned to either the uncertainty or certainty condition, using the same picture viewing task as in Study 2. After the manipulation, participants were asked to indicate their attitudes towards the two sustainable products (seafood and lamp) on a scale ranging from 1 (*not at all attractive*) to 7 (*very attractive*). Then, as a manipulation check, participants were asked to indicate whether the picture primes they viewed were 1 (*uncertain*) to 5 (*certain*; see Study 2). This was followed by the same mood question as used in Studies 1 and 2. Finally, participants answered some demographic questions, including their level of proficiency in English (1 = *very bad*, 2 = *bad*, 3 = *poor*, 4 = *average*, 5 = *fair*, 6 = *good*, 7 = *very good*), as the understanding of the description accompanying the sustainable products was of particular importance, and were thanked for their participation.

5.2. Results

5.2.1. Manipulation check

The results from the ANOVA revealed that the manipulation was successful. Within the uncertainty condition participants indicated that the pictures depicted a less certain scenario ($M = 3.04$, $SD = 1.40$) in comparison to participants in the certainty condition ($M = 4.24$, $SD = 0.79$), $F(1, 163) = 46.26$, $p < .001$, part. $\eta^2 = 0.22$.

5.2.2. Sustainable attitudes

The results from the ANOVA revealed no main effect of condition ($F(1, 157) = 0.73$, $p = .39$, part. $\eta^2 = 0.01$) or of message frame ($F(1, 157) = 1.15$, $p = .29$, part. $\eta^2 = 0.01$) on sustainable attitudes. As predicted, the analysis revealed a significant interaction between condition and message frame, $F(1, 157) = 4.21$, $p = .04$, part. $\eta^2 = 0.03$[3] (displayed in Fig. 2). Simple effect tests showed that participants in the uncertainty condition displayed more positive sustainable attitudes when the sustainable

[3] Since product evaluation is based on the accompanied message frame, it is strongly language sensitive. Therefore, participants with a bad or very bad level of proficiency in English ($N = 3$) were excluded from the analyses. Results for the interaction effect of condition and message frame on sustainable attitudes including all participants were: $F(1, 161) = 2.59$, $p = .11$, part. $\eta^2 = 0.02$.

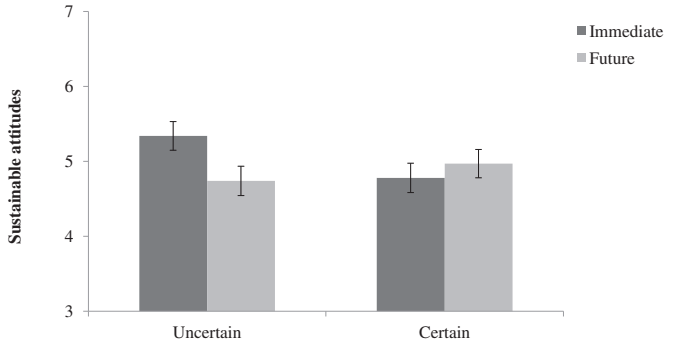

Fig. 2. Influence of condition (uncertain vs. certain) and message frame (immediate vs. future) on sustainable attitudes (Study 3). Error bars indicate ±1 standard error of the mean.

products were advertised with an immediate benefits message frame ($M = 5.35$, $SD = 1.23$) in comparison to a future benefits message frame ($M = 4.74$, $SD = 1.33$), $F(1, 157) = 4.85$, $p = .03$, part. $\eta^2 = 0.03$. No difference between the immediate and future benefits message frame on sustainable attitudes was found for participants in the certainty condition ($M_{Immediate} = 4.79$, $SD = 1.08$; $M_{Future} = 4.97$, $SD = 1.25$), $F(1, 157) = 0.48$, $p = .49$. Moreover, participants in the uncertainty condition displayed more positive sustainable attitudes when the sustainable products were advertised with an immediate benefits message frame ($M = 5.35$, $SD = 1.23$) than participants in the certainty condition ($M = 4.79$, $SD = 1.08$), $F(1, 157) = 4.25$, $p = .04$, part. $\eta^2 = 0.03$. No difference was found between the uncertainty and certainty condition for sustainable attitudes when the sustainable products were advertised with a future benefits message frame, $F(1, 157) = 0.71$, $p = .40$, part. $\eta^2 = 0.01$.

5.2.3. Mood

The results from the ANOVA revealed that condition affected mood, $F(1, 163) = 138.13$, $p < .001$, part. $\eta^2 = 0.46$. Similar to the previous studies, participants in the certainty condition displayed a more positive mood ($M = 3.49$, $SD = 0.79$) than participants in the uncertainty condition ($M = 2.23$, $SD = 0.57$). When mood was included as a covariate, results revealed a main effect of mood on perceived attractiveness of the sustainable products, $F(1, 156) = 6.29$, $p = .01$, part. $\eta^2 = 0.04$. Importantly, the predicted interaction between condition and the message frame remained significant, $F(1, 156) = 4.75$, $p = .03$, part. $\eta^2 = 0.03$. Again, simple effect tests showed that in the uncertainty condition the sustainable products were rated as more attractive when they were accompanied with an immediate benefits message frame than with a future benefits message frame, $F(1, 156) = 4.19$, $p = .04$, part. $\eta^2 = 0.03$ ($M_{Immediate} = 5.09$, $SE = 0.22$ and $M_{Future} = 4.54$, $SE = 0.21$), whereas no difference in attractiveness rating between frames was found in the certainty condition, $F(1, 156) = 1.04$, $p = .31$. Reconciling the results of Study 3 with Studies 1 and 2, after controlling for mood, participants rated the future benefits message frame as less attractive in the uncertainty condition than in the certainty condition, $F(1, 156) = 4.66$, $p = .03$, part. $\eta^2 = 0.03$ ($M_{Uncertain} = 4.54$, $SE = 0.21$ and $M_{Certain} = 5.25$, $SE = 0.22$), whereas no difference was found between conditions for the immediate benefits message frame, $F(1, 156) = 0.12$, $p = .73$. This indicates, as was predicted, that the negative main effect of uncertainty on sustainability is most likely due to the default perception that sustainable products provide future benefits, and that these future benefits are less valued by people in the uncertainty condition. The unexpected finding – when not controlled for mood – that sustainable attitudes were the highest in the uncertainty condition (even more than the certainty condition) when the sustainable products were advertised with an immediate message frame, could be explained by the heightened negative mood in the uncertainty condition. Research has shown that people want to restore their negative mood with immediate benefits (Tice, Baumeister, & Zhang, 2004). In other words, the negative mood of participants in the uncertainty condition probably causes the heightened attractiveness of the sustainable product accompanied with an immediate benefits message frame, hence, the high sustainable attitude.

5.3. Discussion

In sum, the results of Study 3, while controlling for mood, show that the attitude towards sustainable products is lowest in the uncertainty condition when the sustainable products were advertised with a future benefits message frame. Moreover, highlighting immediate benefits buffers the negative effect of uncertainty on sustainability, bringing rated attractiveness back to the level of responses in the certainty condition. This indicates that a communication strategy emphasizing the immediate benefits of sustainability can enhance sustainable attitudes during uncertain times, supporting H3. Conversely, participants were not influenced by the message frames when facing certainty.

6. Study 4: field study

Study 3 provided the first evidence for the idea that emphasizing immediate benefits can enhance sustainable attitudes under uncertainty. Study 4 builds on this study in two important ways: first, instead of a lab setting, this study was conducted in a natural setting at the central train station in Brussels two weeks after the terror attack on the airport and subway system on March

22, 2016. A key reason for choosing this research setting was the high level of uncertainty people naturally faced following the attack. Second, instead of sustainable attitudes and behavioral intentions, Study 4 tests actual sustainable behavior (i.e., donation amount to the non-profit organization WWF, which is, besides the protection of animals, dedicated to the preservation of nature).

6.1. Method

6.1.1. Participants and design

Two hundred and sixty consumers were approached at the Brussels train station and asked to make a donation to the environmental non-profit organization WWF. The study was set up as a two group (message frame: immediate vs. future) between-subjects design. In total, 128 consumers were approached with an immediate message frame (i.e., highlighting the immediate benefits of donating) and 132 consumers were approached with a future message frame (i.e., highlighting the future benefits of donating).

6.1.2. Stimuli

6.1.2.1. Manipulation of the message frame. A standardized verbal script was used to approach consumers and ask them to donate, emphasizing either the immediate or future benefits of the donation. The script was: "Alongside the protection of animals, WWF is already fighting for many years against air pollution in major European cities like Brussels, because the pollution has a very negative effect on the environment and the current (future) health of your lungs. If you care about the environment and thus the current (future) preservation of clean air and lungs, please support us with your donation." An actual donation box of WWF was used to collect the donations. On each side of the donation box a slogan corresponding the verbal script was printed: "Care about your current (future) health!"

6.1.3. Procedure and measures

Two weeks after the terror attacks at Brussels airport and subway system on March 22, 2016, two research assistants went to Brussels' central station to collect donations for the non-profit environmental organization WWF. The research assistants were blind to the hypotheses and collected donations for 4 h, each on a different day. On Monday April 4, 2016, the research assistant began with the future condition from 10:00 to 11:00 am, followed by the immediate condition for 2 h (with a lunch in between for the assistant), and the fourth hour from 1:30 to 2:30 pm was dedicated to the future condition again. On Thursday April 7, 2016, the order was reversed. The research assistants approached consumers with a WWF box and asked for a donation, either emphasizing the immediate or the future benefits of the donation. The number of consumers who did not donate ($N = 193$; $N_{Immediate} = 90$, $N_{Future} = 103$) was reported on a form. Consumers who did donate ($N = 67$; $N_{Immediate} = 38$, $N_{Future} = 29$) were asked to answer four additional questions: three demographic questions (age, gender, and nationality) and a final question to validate our assumption that a terror attack makes consumers perceive the world as more uncertain: "I think the world in which we live is unpredictable and uncertain" on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The amount of every donation was reported on the back of the survey. Some consumers did not answer the four survey questions ($N = 14$; $N_{Immediate} = 8$, $N_{Future} = 6$).

6.2. Results

6.2.1. Perceived uncertainty

The analysis of perceived uncertainty revealed that participants found the world in which they live more unpredictable and uncertain ($M = 4.60$, $SD = 1.28$) than the neutral point (4 on a 7-point Likert scale), $t(52) = 3.44$, $p = .001$. This means that consumers did perceive the world as uncertain two weeks after the terror attack.

6.2.2. WWF donation

A multinomial logistic regression revealed that a higher proportion of consumers who were told about the donations' immediate benefits made a donation to WWF (29.7%) than consumers who were told about the donations' future benefits (22.0%), but this effect was only directional, $\chi^2(1, N = 260) = 2.03$, $p = .15$, Nagelkerke $R^2 = 0.01$. However, for those who donated, an ANOVA revealed that consumers who were told about the immediate benefits of donating, donated more money (in euros) on average to WWF ($M = 1.74$, $SD = 1.09$) than consumers who were told about the future benefits ($M = 1.26$, $SD = 0.90$), $F(1, 65) = 5.43$, $p = .02$, part. $\eta^2 = 0.08$.

6.3. Discussion

The findings of Study 4 replicate those of Study 3 in a natural setting. Moreover, it measures actual donation behavior to an environmental non-profit organization and provides ecological validity to our earlier results. The findings consistently show that emphasizing the immediate benefits of supporting a sustainable organization, as opposed to the future benefits, is a successful strategy to promote sustainable behavior under uncertainty. Additionally, whereas Study 1 elicited uncertainty through personally recalled events and Studies 2 and 3 manipulated uncertainty by displaying pictures of the economic crisis, Study 4 utilized natural occurring feelings of uncertainty after a terror attack, demonstrating the generalizability of the effects.

7. General discussion

The sustainability problems that the world faces today pose serious problems to our society. This makes sustainable behavior a priority for policy makers, responsible marketers, consumers, and academic researchers (Gardner & Stern, 2002; Spence, Poortinga, & Pidgeon, 2012). However, motivating consumers to act sustainably is a challenging task (e.g., Dietz et al., 2003; Penn, 2003). In addition, uncertainty is becoming more pronounced in modern life, which is evident through the increased occurrence of unpredictable events such as economic crises and terror attacks. The current research investigated the negative impact of uncertainty on sustainability, the mediating role of temporal discounting, and a possible strategy to mitigate this negative effect by emphasizing the immediate benefits of sustainability.

Four experiments showed convergent evidence for our predictions. Studies 1 and 2 showed that uncertainty leads to a lower preference for sustainable products in comparison to certainty. Participants were less willing to pay for sustainable products and preferred to buy non-sustainable, luxury products over sustainable ones. Study 2 replicated this effect and, in addition, provided evidence for the mediating effect of temporal discounting. The results showed that participants who experienced higher levels of uncertainty displayed enhanced temporal discounting, indicating a focus on immediate over future benefits. The heightened level of temporal discounting, in turn, negatively affected sustainable behavior. This reveals that uncertainty makes consumers more present oriented, which conflicts with the future focus of sustainable behavior, and thus decreases sustainable behavior. Study 3 showed that consumer attitudes towards sustainable products became more positive when immediate benefits were emphasized under uncertainty. This indicates that employing a communication strategy emphasizing the immediate benefits of sustainability is a valuable technique for policy makers and responsible marketers to promote sustainable behavior. Finally, Study 4 showed that this communication strategy can also be effective in the real world. In addition, it replicated the results with actual behavior. This shows that, as consumers are more oriented to the "here and now" when facing uncertainty, a message frame highlighting immediate benefits of sustainable products fits such a present orientation.

7.1. Theoretical implications

The current research contributes and extends literature on the understanding and the promotion of sustainable behavior in multiple ways. Scholars acknowledge that motivating people to behave sustainably is of paramount importance, but is also challenging (Clayton et al., 2015; Dietz et al., 2003; Spence & Pidgeon, 2010). A lot of work has focused on individual factors such as consumer knowledge, environmental concern, attitudes, norms, and values (Kollmuss & Agyeman, 2002). Although these internal factors are important, the effect of external factors on the willingness to behave sustainably has received less attention. Our research contributes to the literature by studying a key external factor that is highly prevalent in modern societies (Arkin et al., 2013), but has not yet been tested systematically in relation to sustainability: uncertainty. Examining sustainable behavior across contexts with varying levels of uncertainty contributes to existing knowledge and can set boundary conditions for accepted theories and findings in this field.

We proposed life history theory as a valuable theory to help explain why consumers act non-sustainably during uncertainty. We argued and showed that because people focus on short-term outcomes in unpredictable and unstable environments, they behave less sustainably under uncertainty. In doing so, the current research follows an evolutionary perspective to study sustainable behavior, which fits well with recent calls to adopt an evolutionary perspective in consumer research (Hantula, 2003; Pham, 2013). Although life history theory is especially useful in explaining our findings given it is studying the impact of (un)certainty on people's behavior, there may be other tangential theoretical frameworks that can be linked to the findings. One such theoretical framework is construal level theory. Specifically, people seem to adopt a lower-level processing style (i.e., low-level construal), as compared to a higher-level processing style (i.e., high-level construal) when feeling threatened (Schwarz, 2002). Such low-level processing style makes people process information more detailed, which would fit more with concrete as opposed to abstract messages (Trope & Liberman, 2010). Indeed Van Dam and Van Trijp (2011) showed that in general, but not necessarily related to uncertainty, concrete messages predict sustainable behavior better as opposed to abstract messages.

Scholars in the area of decision making are not unanimous about whether certainty (i.e., getting something for sure versus a probability) or immediacy (i.e., getting something now versus getting more later) is a stronger predictor of people's behavior, and whether they are related or distinctive constructs. The current paper contributes to this stream of literature by taking a different approach of manipulating uncertainty, as we used exogenous manipulations (e.g., pictures and scenarios) instead of endogenous measures (probability discounting). In doing so, we find that uncertainty and temporal discounting are two distinctive constructs, which is more in line with Andreoni and Sprenger (2012), who claimed that certainty and immediacy are different constructs, than with Halevy (2008), who argued that they are closely related. Moreover, we found a causal relationship between uncertainty and temporal discounting, showing that uncertainty enhances people's temporal discounting. Hence, this finding is in line with Keren and Roelofsma (1995) who argued that immediacy is more likely a derivative of certainty, and contradictory to Rachlin, Logue, Gibbon, and Frankel (1986) who argued that this pattern is reversed.

Finally, this research contributes to previous research that demonstrated that here-and-now messages are a generally useful strategy to increase sustainable behavior as opposed to messages highlighting its relevance for the future (Gardner & Stern, 2002; Leiserowitz, 2005; Li et al., 2011). Specifically, our work provides boundary conditions for the effectiveness of using here-and-now messages to promote sustainability. Particularly, we show that highlighting immediate benefits of sustainable behavior is mainly fruitful when facing uncertainty, but that this message frame does not affect sustainable behavior under certainty. Therefore, our findings indicate that it is important to adjust the marketing strategy for the promotion of sustainable behavior

depending on uncertainty. During uncertainty, one should match the message frame to people's immediate orientation in order to promote sustainable behavior, whereas it is less systematically clear which message frame can be effective during certainty.

7.2. Policy and managerial implications

The current research aimed to provide practical insights applicable to the promotion of sustainable behavior for non-profits, for-profits, and governmental agencies. It provides insights into the conditions under which consumers behave more or less sustainably. For example, our findings are relevant for product managers and campaigners who search for the right timing to launch a new sustainable product, as they indicate that the probability of adoption will be lower during uncertain times as opposed to certain times, especially when the future benefits are advertised.

Furthermore, by understanding the fundamental needs of consumers under different situational contexts, such as uncertainty, policy makers, and marketers will be able to develop strategies that fit those needs of consumers better. During uncertain times or when uncertainty is activated, consumers are more encouraged to act sustainably when the immediate benefits of sustainable behavior are emphasized. This strategy is especially applicable for communication and advertising strategies (White & Simpson, 2013). For example, when consumers' motivations are focused on short-term outcomes due to uncertainty (e.g., during a recession), marketers can apply this knowledge by adjusting advertising messages and focusing on the immediate benefits of the sustainable product. In addition, when a product is sold in different countries, the message can be adjusted depending on the country-specific level of uncertainty (e.g., using consumer confidence ratings as a proxy for uncertainty).

Instead of changing the message of the sustainable product, pro-social marketers and policy makers could also attempt to shift consumers' temporal focus during uncertain times. This could be done by highlighting the stability, predictability, and safety dimensions of the world in which consumers live (Griskevicius, Cantú, & Van Vugt, 2012). Another way in which this could be done is by confronting consumers with nature. Research has shown that natural scenery (pictures of nature as well as being in nature) makes consumers value the future more and discount it less in comparison to urban scenery (Van der Wal, Schade, Krabbendam, & Van Vugt, 2013). Marketers and policy makers can use natural visuals while promoting sustainable behavior under uncertainty.

7.3. Limitations and future research directions

Following the convention in the marketing literature, our studies relied mostly on attitudinal and behavioral intention measures of sustainability. However, the field study complemented these measures by incorporating actual sustainable behavior (money donated to a sustainable non-profit organization). Further, an effort was made to further generalize the findings in multiple ways. Specifically, the current research found consistent support for the hypotheses across several uncertainty evoking situations, a broad range of product categories (e.g., jeans, lamps, fish), empirical settings (online, lab, and field), populations (students/non-students, travellers at a train station), and measures (attitudes, willingness to pay, actual donations).

As our results showed both partial and full mediation of temporal discounting, it leaves room for other underlying mechanisms that may explain why uncertainty makes consumers act less sustainably. Future research could examine whether self-control could explain part of the effect. For instance, recent research has shown that consumers become more impulsive (i.e., display lower levels of self-control) and make more unhealthy food choices under uncertainty (Milkman, 2012). Furthermore, it has been demonstrated that lower levels of self-control makes people more selfish and care less for others (Balliet & Joireman, 2010) and that selfishness results in more non-sustainable behavior (Van Vugt, Meertens, & Van Lange, 1995).

Our research included different types of uncertainty, such as economic crisis, uncertainty arising after a terror attack, and feelings of uncertainty elicited through personal events. With the exception of Study 1, which activated uncertainty through the recall of both positive and negative uncertain events, the other studies focused on negative forms of uncertainty. However, when controlling for mood, the predicted effect remained, or were even strengthened, indicating that valence could not explain the effect. Future research could investigate the effects of positive uncertainty on sustainable behavior, such as digitalization and globalization (Arkin et al., 2013). Still, it is expected that positive uncertainty would show a similar pattern of results, as it is the unpredictability of uncertainty making people focus on the short-term outcomes, hindering sustainable behavior.

8. Conclusions

Since sustainability problems are significant and global, the necessity to act sustainably is acute. It is therefore critical to understand which conditions hinder or foster sustainable behavior. Our research shows that uncertainty leads consumers to act less sustainably. Although this is troubling, as uncertainty is highly prevalent in modern society, it does not mean that the promotion of sustainable behavior is destined to fail. Specifically, the current research shows that highlighting the immediate benefits of sustainable behavior during uncertainty can lead consumers to act more sustainably.

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Appendix A

Product manipulation with on the left the conventional products and on the right the sustainable products (Study 1).

Appendix B

Product A/B manipulation with the bold letter product being the sustainable variant (Study 2).
Product 1A
Sub-Zero ED40 Elite Dishwasher ($1100)
Comes in choice of stainless steel or white exterior with black chrome trim
Features a revolutionary heated drying system that eliminates water spots
Has powerful water sprays but produces no sound
Product 1B
Sub-Zero Eco-Trend Dishwasher ($1100)
Has a standard 40-minute running cycle
Uses a recirculating water system to save water
Is made with recycled components
Product 2A
North Face Eco-Life Backpack ($64)
Made from 100% organic fibers
Utilitarian design minimizes waste in the construction process
Comes with instructions on how to recycle the backpack when you are done with it

Product 2B
North Face KD100 Ultra-Strength Backpack ($64)
Contains eight different storage compartments for maximum versatility
Stylish design crafted with water-resistant coating
Solid construction lasts twice as long as the next leading brand on the market
Product 3A
Target brand Chromium-Plated Lamp with Silk Shade ($60)
Lamp frame is plated with Chromium that is resistant to dulling
Uses an adjustable 150-watt incandescent bulb with four brightness settings
Silk shade produces optimal ambient light filtering
Product 3B
Target brand Efficiency Low-Wattage Lamp with Organic Cloth Shade ($60)
Lamp frame is constructed in a clean and waste-friendly facility that does not produce toxic waste
Comes with a single-setting fluorescent bulb that uses only 15% of the electricity of conventional bulbs
Cloth shade made from recycled organic cotton fibers

Appendix C

Product manipulation with on the top the immediate benefits framing and on the bottom the future benefits framing (Study 3).

Sustainable seafood for immediate pleasure

Sustainable seafood is seafood that is caught or farmed in ways that consider the well-being of the fishes, seas, and oceans.

Choosing sustainable seafood reduces overfishing directly and leads to immediate pleasure since sustainable seafood is fresher and has a better taste.

Sustainable seafood for future pleasure

Sustainable seafood is seafood that is caught or farmed in ways that consider the well-being of the fishes, seas, and oceans.

Choosing sustainable seafood reduces imminent overfishing and leads to future pleasure since sustainable seafood supports the survival of marine life.

Immediate benefits of LED lighting

Replacing a regular light bulb with a LED light bulb helps reducing the use of energy.

Choosing a LED light bulb helps you save money immediately and it uses up to 70% less energy.

Future benefits of LED lighting

Replacing a regular light bulb with a LED light bulb helps reducing the use of energy.

Choosing a LED light bulb lowers the end of the year energy bill and reduces our future energy problems.

Appendix D

Means and standard deviations per product (Studies 1–3).

Table 1
Results of Study 1: Willingness to pay in euros.

		Uncertainty		Certainty	
		M	*SD*	*M*	*SD*
Jeans	Sustainable	49.64	7.25	51.52	9.81
	Non-sustainable	49.16	5.61	47.57	3.73
Candles	Sustainable	2.67	0.65	3.24	0.89
	Non-sustainable	2.85	0.65	2.81	0.73
Copy paper	Sustainable	3.78	0.59	4.25	0.79
	Non-sustainable	3.91	0.63	3.81	0.84

For the jeans, the scale ranged from 45 to 80 euros in seven increments of 5 euros. For the candles, the scale ranged from 2.15 to 4.95 euros in seven increments of 40 cents. For the copy paper, the scale ranged from 3.35 to 7.55 euros in seven increments of 60 cents.

Table 2
Results of Study 2: Sustainable product preference.

		Uncertainty			Certainty		
		M	*SD*	%	*M*	*SD*	%
Dishwasher	Attractiveness	5.04	3.06		5.80	2.98	
	Choice			54.8			62.4
Backpack	Attractiveness	3.44	2.71		4.11	2.96	
	Choice			24.0			31.2
Lamp	Attractiveness	5.62	2.94		6.36	2.63	
	Choice			65.4			74.3

Attractiveness was measured on a 9-point scale, lower scores indicate a higher attractiveness of the luxurious product and higher scores indicate a higher attractiveness of the sustainable product. Choice score indicates how frequently participants chose the sustainable product.

Table 3
Results of Study 3: Perceived products' attractiveness.

		Uncertainty		Certainty	
		M	*SD*	*M*	*SD*
Seafood	Immediate	5.07	1.75	4.55	1.50
	Future	4.67	1.75	4.73	1.77
Lamp	Immediate	5.49	1.49	5.02	1.66
	Future	4.90	1.59	5.10	1.75

Attractiveness was measured on a 7-point Likert scale ranging from 1 = not at all attractive to 7 = very attractive.

References

Andreoni, J., & Sprenger, C. (2012). Risk preferences are not time preferences. *The American Economic Review*, *102*, 3357–3376.
Arkin, R. M., Oleson, K. C., & Carroll, P. J. (2013). *Handbook of the uncertain self*. New York: Psychology Press.
Balliet, D., & Joireman, J. (2010). Ego depletion reduces proselfs' concern with the well-being of others. *Group Processes & Intergroup Relations*, *13*, 227–239.
Botkin, D. B., & Keller, E. A. (2010). *Environmental science. Earth as a living planet* (7th ed.). Hoboken, NJ: John Wiley & Sons.
Chisholm, J. S., Ellison, P. T., Evans, J., Lee, P. C., Lieberman, L. S., Pavlik, Z., ... Worthman, C. M. (1993). Death, hope, and sex: Life-history theory and the development of reproductive strategies. *Current Anthropology*, *34*, 1–24.
Clayton, S., Devine-Wright, P., Stern, P. C., Whitmarsh, L., Carrico, A., Steg, L., ... Bonnes, M. (2015). Psychological research and global climate change. *Nature Climate Change*, *5*, 640–646.
Daase, C., & Kessler, O. (2007). Knowns and unknowns in the 'war on terror': Uncertainty and the political construction of danger. *Security Dialogue*, *38*, 411–434.
Deleersnyder, B., Dekimpe, M. G., Sarvary, M., & Parker, P. M. (2004). Weathering tight economic times: The sales evolution of consumer durables over the business cycle. *Quantitative Marketing and Economics*, *2*, 347–383.
Dietz, T., Ostrom, E., & Stern, P. C. (2003). The struggle to govern the commons. *Science*, *302*, 1907–1912.
Ellis, B. J., Figueredo, A. J., Brumbach, B. H., & Schlomer, G. L. (2009). Fundamental dimensions of environmental risk. *Human Nature*, *20*, 204–268.
Ellsberg, D. (1961). Risk, ambiguity, and the savage axioms. *Quarterly Journal of Economics*, *75*, 643–669.
Esses, V. M., Medianu, S., & Lawson, A. S. (2013). Uncertainty, threat, and the role of the media in promoting the dehumanization of immigrants and refugees. *Journal of Social Issues*, *69*, 518–536.
Faraji-Rad, A., & Pham, M. T. (2016). Uncertainty increases the reliance on affect in decisions. *Journal of Consumer Research*, *44*, 1–21.
Fox, C. R., & Ulkümen, G. (2011). Distinguishing two concepts of uncertainty. In W. Brun, G. Keren, G. Kirkebøen, & H. Montgomery (Eds.), *Perspectives on thinking, judgment, and decision making* (pp. 21–35). Oslo: Universitetsforlaget.
Gardner, G. T., & Stern, P. C. (2002). *Environmental problems and human behavior* (2nd ed.). Boston: Pearson Custom Publishing.

Geels, F. W. (2013). The impact of the financial–economic crisis on sustainability transitions: Financial investment, governance and public discourse. *Environmental Innovation and Societal Transitions*, *6*, 67–95.
Green, L., & Myerson, J. (2004). A discounting framework for choice with delayed and probabilistic rewards. *Psychological Bulletin*, *130*, 769–792.
Greenpeace (2017, October 23). No fish, no future! Retrieved from http://www.greenpeace.org/eastasia/multimedia/photos/oceans/no-fish-no-future/.
Griskevicius, V., Ackerman, J. A., Cantú, S. M., Delton, A. W., Robertson, T. E., Simpson, J. A., ... Tybur, J. M. (2013). When the economy falters, do people spend or save? Responses to resource scarcity depend on childhood environment. *Psychological Science*, *24*, 197–205.
Griskevicius, V., Cantú, S. M., & Van Vugt, M. (2012). The evolutionary bases for sustainable behaviour: Implications for marketing, policy, and social entrepreneurship. *Journal of Public Policy & Marketing*, *31*, 115–128.
Griskevicius, V., Tybur, J. M., & Van den Bergh, B. (2010). Going green to be seen: Status, reputation, and conspicuous conservation. *Journal of Personality and Social Psychology*, *98*, 392–404.
Hantula, D. A. (2003). Guest editorial: Evolutionary psychology and consumption. *Psychology and Marketing*, *20*, 757–763.
Halevy, Y. (2008). Strotz meets allais: Diminishing impatience and the certainty effect. *American Economic Review*, *98*, 1145–1162.
Hill, S. E., Rodeheffer, C. D., Griskevicius, V., Durante, K., & White, A. E. (2012). Boosting beauty in an economic decline: Mating, spending, and the lipstick effect. *Journal of Personality and Social Psychology*, *103*, 275–291.
Joireman, J. A., Van Lange, P. A. M., & Van Vugt, M. (2004). Who cares about the environmental impact of cars? Those with an eye toward the future. *Environment and Behavior*, *36*, 187–206.
Kahneman, D., & Tversky, A. (1982). Variants of uncertainty. *Cognition*, *11*, 143–157.
Kamakura, W. A., & Du, R. Y. (2012). How economic contractions and expansions affect expenditure patterns. *Journal of Consumer Research*, *39*, 229–247.
Kaplan, H. S., & Gangestad, S. W. (2005). Life history theory and evolutionary psychology. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 68–95). New York: John Wiley & Sons.
Karanikolos, M., Mladovsky, P., Cylus, J., Thomson, S., Basu, S., Stuckler, D., ... McKee, M. (2013). Financial crisis, austerity, and health in Europe. *The Lancet*, *381*, 1323–1331.
Kasser, T., & Sheldon, K. M. (2000). Of wealth and death: Materialism, mortality salience, and consumption behavior. *Psychological Science*, *11*, 348–351.
Keren, G., & Roelofsma, P. (1995). Immediacy and certainty in intertemporal choice. *Organizational Behavior and Human Decision Processes*, *63*, 287–297.
Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do consumers act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, *8*, 239–260.
Lamey, L., Deleersnyder, B., Dekimpe, M. G., & Steenkamp, J. B. E. M. (2007). How business cycles contribute to private-label success: Evidence from the United States and Europe. *Journal of Marketing*, *71*, 1–15.
Leiserowitz, A. A. (2005). American risk perceptions: Is climate change dangerous? *Risk Analysis*, *25*, 1433–1442.
Li, Y., Johnson, E. J., & Zaval, L. (2011). Local warming daily temperature change influences belief in global warming. *Psychological Science*, *22*, 454–459.
Lipshitz, R., & Strauss, O. (1997). Coping with uncertainty: A naturalistic decision-making analysis. *Organizational Behavior and Human Decision Processes*, *69*, 149–163.
Luchs, M. G., Walker Naylor, R., Irwin, J. R., & Raghunathan, R. (2010). The sustainability liability: Potential negative effects of ethicality on product preference. *Journal of Marketing*, *74*, 18–31.
Mayer, N. (2013). From Jean-Marie to Marine Le Pen: Electoral change on the far right. *Parliamentary Affairs*, *66*, 160–178.
Milfont, T. L., Wilson, J., & Diniz, P. (2012). Time perspective and environmental engagement: A meta-analysis. *International Journal of Psychology*, *47*, 325–334.
Milkman, K. L. (2012). Unsure what the future will bring? You may overindulge: Uncertainty increases the appeal of wants over shoulds. *Organizational Behavior and Human Decision Processes*, *119*, 163–176.
Milliken, F. (1987). Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. *Academy of Management Review*, *12*, 133–143.
Nettle, D. (2010). Dying young and living fast: Variation in life history across English neighborhoods. *Behavioral Ecology*, *21*, 387–395.
Neumayer, E. (2004). The environment, left-wing political orientation and ecological economics. *Ecological Economics*, *51*, 167–175.
Penn, D. J. (2003). The evolutionary roots of our environmental problems: Toward a Darwinian ecology. *Quarterly Review of Biology*, *78*, 275–301.
Pham, M. T. (2013). The seven sins of consumer psychology. *Journal of Consumer Psychology*, *23*, 411–423.
Phipps, M., Ozanne, L. K., Luchs, M. G., Subrahmanyan, S., Kapitan, S., Catlin, J., ... Weaver, S. T. (2013). Understanding the inherent complexity of sustainable consumption: A social cognitive framework. *Journal of Business Research*, *66*, 1227–1234.
Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Assessing moderated mediation hypotheses: Theory, methods and prescriptions. *Multivariate Behavioral Research*, *42*, 185–227.
Rachlin, H., Logue, A. W., Gibbon, J., & Frankel, M. (1986). Cognition and behavior in studies of choice. *Psychological Review*, *93*, 33–45.
Schwarz, N. (2002). Situated cognition and the wisdom of feelings: Cognitive tuning. In L. Feldman Barrett, & P. Salovey (Eds.), *The wisdom in feelings* (pp. 144–166). New York: Guilford.
Scruggs, L., & Benegal, S. (2012). Declining public concern about climate change: Can we blame the great recession? *Global Environmental Change-Human and Policy Dimensions*, *22*, 505–515.
Skovgaard, J. (2014). EU climate policy after the crisis. *Environmental Politics*, *23*, 1–17.
Spence, A., & Pidgeon, N. F. (2010). Framing and communicating climate change: The effects of distance and outcome frame manipulations. *Global Environmental Change*, *20*, 656–667.
Spence, A., Poortinga, W., & Pidgeon, N. F. (2012). The psychological distance of climate change. *Risk Analysis*, *32*, 957–972.
The World Bank (2016). Retrieved from http://data.worldbank.org/indicator/ny.gdp.mktp.kd.zg.
Tice, D. M., Baumeister, R. F., & Zhang, L. (2004). The role of emotion in self-regulation: Differing roles of positive and negative emotion. In P. Philippot, & R. S. Feldman (Eds.), *The regulation of emotion* (pp. 213–226). Mahwah, NJ: Lawrence Erlbaum.
Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, *117*, 440–463.
Van Dam, Y. K., & Van Trijp, H. C. (2011). Cognitive and motivational structure of sustainability. *Journal of Economic Psychology*, *32*, 726–741.
Van Horen, F., & Mussweiler, T. (2014). Soft assurance: Coping with uncertainty through haptic sensations. *Journal of Experimental Social Psychology*, *54*, 73–80.
Van den Bos, K. (2001). Uncertainty management: The influence of uncertainty salience on reactions to perceived procedural fairness. *Journal of Personality and Social Psychology*, *80*, 931–941.
Van der Wal, A. J., Schade, H. M., Krabbendam, L., & Van Vugt, M. (2013). Do natural landscapes reduce temporal discounting in humans? *Proceedings of the Royal Society B*, *280*(1773), 20132295.
Van Rossum, M. (2012, December 6). Nederland spijkerbroekenland: Blue jeans in het Centraal Museum. NRC. Retrieved from https://www.nrc.nl.
Van Trijp, H. C. (2014). *Encouraging sustainable behavior. Psychology and the environment.* New York: Psychology Press.
Van Vugt, M., Meertens, R. M., & Van Lange, P. A. M. (1995). Car versus public transportation? The role of social value orientations in a real-life social dilemma. *Journal of Applied Social Psychology*, *25*, 258–278.
White, K., & Simpson, B. (2013). When do (and don't) normative appeals influence sustainable consumer behaviors? *Journal of Marketing*, *77*, 78–95.
Wilson, M., & Daly, M. (2004). Do pretty women inspire men to discount the future? *Proceedings of the Royal Society B*, *271*, 177–179.
Yilmaz, G. (2012). Exploring the implementation of minority protection rules in the 'worlds of compliance': The case of Turkey. *Perspectives on European Politics and Society*, *13*, 408–424.